1. Determine the acceleration for the two segments shown as well as the total distance travelled in the 20 s period.

2. Normie Neutron rides a super-streamline go-cart from rest down a street that has an incline of 9.5°. The total vertical drop in elevation from the top of the street to bottom is 48 m.
   a) How far did the go-cart travel?
   b) Assuming negligible friction or wind resistance, how fast was Normie travelling when he reached the bottom of the street?
   c) The brakes are then applied, bringing the cart to a stop in 4.7 s. How far does the go-cart travel in that time?

3. Two physics students attempt to play vertical catch with a baseball. Student A holds the ball at street level, while student B is on an apartment balcony, 17.0 m up from the street.
   a) What is the minimum speed at which student A must throw the ball in order for student B to just be able to catch it?
   b) Student A, who has rippling biceps, actually tosses the ball straight up at 25.0 m/s.
      i) How high does the ball go?
      ii) At what times is student B able to catch the baseball?

4. Student B, still on the balcony and with the baseball, throws the ball straight up at 21.7 m/s.
   a) How long will student A, still at street level, have to wait until the ball reaches him?
   b) How fast will it be going?

5. A ball rolls with a speed of 2.0 m/s across a table top that is 1.0 m above the ground. Upon reaching the edge of the table, it follows a parabolic path to its landing spot on the floor. How far along the floor is this spot from the table?

6. A rescue pilot drops a survival kit while her plane is flying at an altitude of 2000 m with a forward velocity of 100 m/s. If air friction is ignored, how far in advance of the starving explorer’s drop zone should she release the package?

7. A rifle is fired horizontally from 1.90 m above the ground. The bullet is found to have travelled 200 m. Ignoring air friction, at what speed must the bullet have been travelling as it left the barrel?

8. A ski jumper leaves the horizontal end of the ramp with a velocity of 25 m/s and lands 70 m from the base of the ramp. How high is the end of the ramp above the landing area?

9. An astronaut stands on the edge of a lunar crater 100 m deep and throws a half-eaten moon-pie
horizontally with a speed of 5.00 m/s. If gravity on the Moon is 1/6 that on Earth, what horizontal distance will the moon-pie travel before hitting the floor of the crater?

10. A ball is projected horizontally at 21 m/s from a point 40 m above the ground. Determine:
   a) the horizontal distance travelled by the ball before hitting the ground.
   b) the ball’s instantaneous velocity as it hits the ground.

1. 2 m/s², -3 m/s², 350 m  
2. a) 290 m  b) 31 m/s  c) 73 m  
3. a) 18.3 m/s  b) i) 31.9 m  ii) after 0.81 s and 4.30 s  
4. a) 5.11 s  b) -28.4 m/s  
5. 0.90 m  
6. 2020 m  
7. 321 m/s  
8. 38 m  
9. 55.5 m  
10. a) 60 m  b) 35 m/s at 53° down